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INTERA

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March 31, 1989

Scott Grace
U.S. Nuclear Regulatory Commission
Licensing Branch
Region IV
730 Simms, Suite 100
Golden, CO 80401

RE: SUA-1472, Condition 31.C, Corrective Action Program, Docket 40-8904

Dear Scott:

INTERA, on behalf of BP AMERICA, initiated a proposal for a Corrective Action Program at L-Bar with a January 31, 1989 letter transmitting two copies of the L-Bar ground water modeling report. The $150 license amendment application fee accompanied that letter. This letter supports that application by providing more details on the proposed corrective action program and supporting rationale. A discussion of the standards set by NRC will precede the description of the corrective action program.

The NRC established ground water protection standards for certain hazardous constituents in Condition 31.B, Amendment 9 of SUA-1472 on December 12, 1988. Specifically these standards are as follows (in mg/l, except as noted):

antimony = 0.2, arsenic = 0.05, barium = 1.0, cadmium = 0.01, nickel = 0.001, selenium = 0.01, uranium = 0.5, combined radium -226 and -228 = 5 pCi/l, thorium 230 = 0.13 pCi/l, and cyanide = 0.01.

Four Point of Compliance (POC) wells and one background well have been designated by Condition 31.A of license SUA-1472. These POC wells are: MW-1A to the northwest of the pond; MW-69 directly west of the pond; MW-81 to the southwest of the pond; and MW-70 to the northeast of the pond. The control well, MW-29A is located northeast of MW-17B.

Certain of the standards have been exceeded at one or more POC wells. Our September 30, 1988 Ground-Water Detection Program submittal indicated that arsenic, barium and cadmium concentrations were not exceeded in any of the POC or background wells. The uranium standard was set at 0.5, which is the level of detection of our laboratory. The uranium concentration of MW-69 is about 1.1 mg/l, twice the standard. The New Mexico ground water standard is 5.0 mg/l.

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This small amount of uranium in ground water in the vicinity of a uranium mine could well be a result of natural uranium in the area. Uranium has been found in a number of the wells at the site. We ask that the NRC reconsider the uranium standard for the L-Bar license.

The antimony standard of 0.20 was again simply the level of detection of our laboratory. Antimony was detected at levels slightly above this at two of the POC wells but not for all sampling periods. In MW-17B, it was detected at 0.24 mg/l once, but not detected at other times. In MW-69, it was detected twice, at 0.27 and 0.25 mg/l but not detected the third time. Concentrations so close to the detection limit are considered suspect by the laboratory. That combined with the intermittent nature of the detections leads us to propose that antimony standards not be considered exceeded for these wells.

The thorium standard was set at 0.13 pCi/l by NRC. We do not understand the rationale for this standard since the background well, MW-29A, had thorium readings as high as 0.21 pCi/l. A series of five supplemental background wells to the west of any known contamination were also sampled as part of the detection monitoring program. All five of these wells had thorium readings higher than the NRC assigned standard, with a maximum reading of 1.9 pCi/l. Three of these supplemental background wells had thorium concentrations higher than the highest concentration in any of the POC wells. We believe the thorium standard should be changed to reflect its natural presence in the area ground water. Given the information presented above, we propose that the thorium standard be no lower than 1.9 pCi/l.

The nickel standard was set at 0.001 mg/l or 1 ppb. While nickel has not been found at the designated background well, 29-A, it has been found at low levels at a number of outlying wells including all but one of the supplemental background wells. Although nickel has been found in all four POC wells, the highest concentration found was only 0.017 mg/l or 17 ppb, well below the level considered a health hazard. According to material derived from the EPA IRIS data base and presented at the October 1988 NRC ACL Workshop, the human health protection limit for nickel is 0.7 mg/l. Further investigation may be warranted to better determine nickel background at the site and to determine the health implications of very low nickel concentrations.

Selenium and cyanide are present at elevated levels at only one POC well, MW-17B. This well also has an elevated nitrate concentration. It is not clear that the tailings pond was the source of these constituents. Cyanide cannot exist in such an acid solution and the nitrate level in the pond was lower than that found in MW-17B. We will continue to investigate the possible source of the contamination. Nevertheless, a pumpback well located near this

contaminated area will work towards cleaning the groundwater contamination in the vicinity.

Corrective Action Program

The corrective action program has two primary goals; i) to cutoff further seepage from the tailings area and ii) to attain ground water quality consistent with the prescribed ground water protection standards and proposed alternate concentration limits. Seepage from the former tailings pond was described in the report "Ground Water Flow and Particle Transport Modeling near the Tailings Disposal Reservoir, L-Bar Uranium Mine, Cibola County, New Mexico" (INTERA, January 1989). The majority of the seepage originating from the tailings area eventually flows to the southwest arroyo. A small portion of seepage originating on the east side of the former tailings pond, in the vicinity of the former saddle dam, flows directly east to Meyers Draw. The seepage areas are reasonably well defined by the 100 mg/L chloride contour. The corrective action program addresses the seepage areas as the 'west seepage area' and 'east seepage area'.

West Seepage Area

Seepage Cutoff

The seepage to the west is addressed with a line of pumpback wells at approximately 400 foot spacing. The pumpback wells on the west side are MW-2A, MW-5, MW-8, MW-10A, MW-13B, MW-27B, MW-77, MW-82, MW-83, and MW-84. In addition the former alluvial trench was deepened to 14 feet into the concrete sump structure constructed to act as the central sump for all the west side pumpback wells. The pumpback system incorporates the previously existing pumpback wells and adds wells MW-77 and MW-84 on the southern part of the west side. A line of 2" piezometers at approximately 400 foot spacing has been installed about 200 feet to the west of the pumpback wells. The piezometers will be used to monitor the hydraulic effectiveness of the pumpback well system.

The pumpback wells will be operated on a continuous pumping basis at individual pumping rates of the order of 0.5 gpm. The northernmost pumpback wells, i.e., MW-10 and MW-5 have historically been capable of providing of the order of 1 to 2 gpm, and these two will continue to be operated at that rate. The northernmost pumpback wells serve to direct the westerly flow along the north side of the tailings area to the south more rapidly than would otherwise be the case. The directed flow is likely effective in maintaining the western seepage area close to the tailings, until the influence of the southwest arroyo is sufficient to direct flow more westerly.

Ground Water Quality Restoration

The seepage cutoff by the western pumpback system will eliminate any further offsite seepage. The pumpback water will be pumped to an evaporation cell located on the eastern side of the former tailings area near the former mill gate. The pumpback system will be continued until the concentration of hazardous constituents in the pumpback water are consistent with the ground water protection standards in the license. It is expected that pumping will continue for a period of 3 to 7 years. Future precipitation infiltration through the tailings will be virtually eliminated due to the radon barrier, therefore the bulk of the seepage to be collected by the pumpback system is consolidation drainage water. The L-Bar reclamation plan provided calculations indicating a relatively short (i.e., weeks to months) expected consolidation period, consequently it is possible that the ground water protection standards may be achieved relatively quickly.

With respect to the seepage affected area between the line of pumpback wells and the southwest arroyos, natural flushing will be employed to achieve ground water quality standards in that area. The L-Bar ground water modeling study cited above suggested that the arroyo acts as an effective ground water discharge boundary for the 1st Tres Hermanos. The model results are verified by the fact that the 1st Tres Hermanos immediately west of the arroyo does not contain ground water as evidenced by the monitoring well (MW-100) installed in February 1989. Ground water discharge in the arroyo is in the form of evapotranspiration, as evidenced by the phreatophyte-type growth in the arroyo.

Natural flushing will be accomplished by i) plume displacement and dilution by ground water flow from the north and ii) snowmelt and precipitation infiltration. Ground water flow velocities in the vicinity of the southwest plume are of the order of 100 to 200 feet/year, therefore plume displacement a distance of 2000 feet should occur over a period of about 10 to 20 years. Piezometers located in the southwest plume will be monitored to verify that the plume is being displaced by natural flushing.

East Seepage Area

The majority of ground water seepage to the east of the former tailings pond is redirected north and south by the natural hydrogeologic regime, ultimately ending up as part of the southwest plume. However, there is a limited portion of the eastern seepage area which is directed toward the arroyo named Meyers Draw. The eastern seepage area is relatively well defined by the 100 mg/L chloride contour.

Seepage Cutoff

The relatively narrow seepage area moving toward Meyers Draw was most likely due to elevated pond water levels near the saddle dam which occurred for a limited period of time during the mill operation. The tailings pond has been eliminated and residual water has been transferred to clay-bottom evaporation cells. The source of the east seepage area has therefore been virtually eliminated. Drainage due to consolidation is expected.

A pumpback well (MW-87) has been installed to the east of the saddle dam. The design contour pumping rate is of the order of 0.5 gpm. The hydraulic conductivity in the 1st Tres Hermanos in the area is of the order of 3×10^{-7} m/s. Calculations indicate that drawdown after 6 months at 1000 ft distance due to pumping at 0.5 gpm is of the order of 2 feet or more. Therefore, it is expected that a single pumping well will fully recover the relatively isolated eastern plume.

Ground Water Quality Restoration

Seepage to the east has been virtually eliminated by removing the pond as the source. The pumpback water from MW-87 will be pumped to an evaporation well located to the south of the former saddle dam, near the former mill gate. The pumpback well will continue operation until the concentrations of hazardous constituents in the pumpback water are consistent with the ground water protection standards in the license.

With respect to any currently defined seepage area which is beyond the zone of influence of the eastern pumpback well, natural flushing will be employed to achieve ground water quality standards. The design pumping rates will recover ground water from all areas currently identified as containing hazardous constituents, therefore natural flushing will likely only be relevant in the case of chloride and sulfate which are the farthest east. The farthest eastern extent of the chloride/sulfate plume may discharge and evaporate in accordance with the natural flushing approach.

Corrective Action Program Costs - Operating Costs

Annual Costs

$$\text{Electricity} = 10 \text{ pumps} \times \frac{1.3 \text{ kw}}{\text{pump}} \times \frac{24 \text{ hr}}{\text{d}} \times \frac{365 \text{ d}}{\text{y}} \times \frac{\$.06}{\text{khw}} = \$6832/\text{yr}$$

Maintenance @ 15% of Capital Cost of $150,000 = $22,500.

Sampling and Laboratory Costs = 15,000

$44,500

If you have any questions please do not hesitate to call.

Sincerely,

T.G. Osborn
Project Manager

Sincerely,

G.E. Grisak
Vice President

cc: Ralph DeLeonardis

TGO:lli
Enclosure